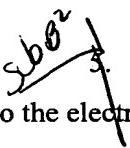


CLAIMS

- 1 1. An ablation treatment apparatus, comprising:
2 an electromagnetic energy source;
3 a trocar including a distal end, and a hollow lumen extending along a
4 longitudinal axis of the trocar;
5 a multiple antenna ablation device including three or more antennas
6 positionable in the lumen and deployable from the trocar lumen in a lateral
7 direction relative to the longitudinal axis at a selected tissue mass, each of a
8 deployed antenna having an electromagnetic energy delivery surface size
9 sufficient to create a volumetric ablation between the deployed antennas without
10 impeding out a deployed antenna when 5 to 200 watts of electromagnetic energy is
11 delivered from the electromagnetic energy source to the multiple antenna ablation
12 device; and
13 at least one cable coupling the multiple antenna ablation device to the
14 electromagnetic energy source.
- 1 2. The apparatus of claim 1, wherein each of the deployed antenna
2 has an electromagnetic energy delivery surface size sufficient to create a
3 volumetric ablation between the deployed antennas without impeding out a
4 deployed antenna when 5 to 100 watts of electromagnetic energy is delivered from
5 the electromagnetic energy source to the multiple antenna ablation device.
- 1 3. The apparatus of claim 1, wherein each of the deployed antenna
2 has an electromagnetic energy delivery surface size sufficient to create a
3 volumetric ablation between the deployed antennas without impeding out a
4 deployed antenna when 5 to 75 watts of electromagnetic energy is delivered from
5 the electromagnetic energy source to the multiple antenna ablation device.

1 4. The apparatus of claim 1, wherein each of the deployed antenna
2 has an electromagnetic energy delivery surface size sufficient to create a
3 volumetric ablation between the deployed antennas without impeding out a
4 deployed antenna when 5 to 50 watts of electromagnetic energy is delivered from
5 the electromagnetic energy source to the multiple antenna ablation device.

1 3.  The apparatus of claim 1, wherein each of the antennas is coupled
2 to the electromagnetic energy source.

1 6. The apparatus of claim 1, wherein the trocar has an outer diameter
2 no greater than 13 gauge.

1 7. The apparatus of claim 1, wherein the trocar has an outer diameter
2 no greater than 14 gauge.

1 8. The apparatus of claim 1, wherein the trocar has an outer diameter
2 no greater than 15 gauge.

1 9. The apparatus of claim 1, wherein four antennas are deployed
2 from the trocar at the selected tissue mass.

1 10. The apparatus of claim 1, wherein five antennas are deployed
2 from the trocar at the selected tissue mass.

1 11. The apparatus of claim 1, wherein six antennas are deployed from
2 the trocar at the selected tissue mass.

1 12. The apparatus of claim 1, wherein at least two of the antennas are
2 deployed out of the trocar distal end.

1 13. The apparatus of claim 1, wherein the trocar includes one or more
2 side ports formed in a body of the trocar.

1 14. The apparatus of claim 9, wherein at least one antenna is deployed
2 into the selected tissue mass from the trocar distal end and at least one antenna is
3 deployed into the selected tissue mass from a side port.

1 15. The apparatus of claim 1, wherein the antennas are RF electrodes
2 and the electromagnetic energy source is an RF energy source.

1 16. The apparatus of claim 1, wherein the multiple antenna ablation
2 device operates in a monopolar mode.

1 17. The apparatus of claim 1, wherein the multiple antenna ablation
2 device operates in a bipolar mode.

1 18. The apparatus of claim 1, wherein the apparatus is switchable
2 between bipolar and monopolar operation.

1 19. The apparatus of claim 1 wherein at least a portion of a distal end
2 of each antenna is constructed to be structurally less rigid than the trocar.

1 20. The apparatus of claim 1, further comprising:
2 a sensor at least partially positioned on an exterior surface of an antenna.

1 21. The apparatus of claim 1, further comprising:
2 an insulation layer positioned in a surrounding relationship around at least
3 a portion of an exterior of the trocar.

1 22. The apparatus of claim 21, wherein a distal end of the insulation
2 layer is removed from the distal end of the trocar and create an electromagnetic
3 energy delivery surface at the distal end of the trocar.

1 23. The apparatus of claim 1, wherein the trocar lumen is coupled to
2 an infusion medium source to receive an infusion medium.

1 24. The apparatus of claim 1, further comprising:
2 a cooling element coupled to at least one of the antennas.

1 25. The apparatus of claim 24, wherein the cooling element
2 comprises:

3 a structure positioned in at least one of the antennas including at least one
4 channel configured to receive a cooling medium.

1 26. The apparatus of claim 24, wherein the cooling medium is
2 recirculated through the channel.

1 27. An ablation treatment apparatus, comprising:
2 an electromagnetic energy source;
3 a trocar including a distal end, and a hollow lumen extending along a
4 longitudinal axis of the trocar;
5 a multiple antenna ablation device including a plurality of antennas
6 positionable in the trocar lumen and deployable from the trocar lumen in a lateral
7 direction relative to the longitudinal axis at a selected tissue mass, wherein the
8 plurality of antennas includes a sufficient number of antennas to create an ablation
9 volume between the antennas in the selected tissue site without impeding out the

10 plurality of antennas when 5 to 200 watts of electromagnetic energy is delivered
11 from the electromagnetic energy source to the plurality of antennas; and
12 at least one cable coupling the multiple antenna ablation device to the
13 electromagnetic energy source.

1 28. The apparatus of claim 27, wherein each of the deployed antenna
2 has an electromagnetic energy delivery surface size sufficient to create a
3 volumetric ablation between the deployed antennas without impeding out a
4 deployed antenna when 5 to 100 watts of electromagnetic energy is delivered from
5 the electromagnetic energy source to the multiple antenna ablation device.

1 29. The apparatus of claim 27, wherein each of the deployed antenna
2 has an electromagnetic energy delivery surface size sufficient to create a
3 volumetric ablation between the deployed antennas without impeding out a
4 deployed antenna when 5 to 75 watts of electromagnetic energy is delivered from
5 the electromagnetic energy source to the multiple antenna ablation device.

1 30. The apparatus of claim 27, wherein each of the deployed antenna
2 has an electromagnetic energy delivery surface size sufficient to create a
3 volumetric ablation between the deployed antennas without impeding out a
4 deployed antenna when 5 to 50 watts of electromagnetic energy is delivered from
5 the electromagnetic energy source to the multiple antenna ablation device.

1 31. The apparatus of claim 27, wherein the trocar has an outer
2 diameter no greater than 15 gauge.

1 32. The apparatus of claim 27, wherein the multiple antenna ablation
2 device is an RF device.

SUBP

1 33. The apparatus of claim 32, wherein the multiple antenna ablation
2 device operates in a monopolar mode.

1 34. The apparatus of claim 32, wherein the multiple antenna ablation
2 device operates in a bipolar mode.

1 35. The apparatus of claim 32, wherein the multiple antenna ablation
2 device is switchable between bipolar and monopolar operation.

SUBS

1 36. A method for creating a volumetric ablation in a selected tissue
2 mass, comprising:

3 providing a multiple antenna ablation apparatus including a trocar with a
4 trocar lumen, a plurality of antennas deployable from the lumen, and an
5 electromagnetic energy source coupled to the plurality of antennas;

6 inserting the trocar into the selected tissue mass with the plurality of
7 antennas positioned in the trocar lumen;

8 advancing the plurality of antennas from the trocar lumen in a lateral
9 direction relative to a longitudinal axis of the trocar into the selected tissue mass;

10 delivering 5 to 200 watts of electromagnetic energy from the
11 electromagnetic energy source to the plurality of antennas without impeding out
12 an antenna of the plurality of antennas; and

13 creating the volumetric ablation in the selected tissue mass.

SUBS DS

1 37. The method of claim 36, wherein 5 to 100 watts of
2 electromagnetic energy source to the plurality of antennas without impeding out
3 an antenna of the plurality of antennas.

SUB D

1 38. The method of claim 36, wherein 5 to 75 watts of electromagnetic
2 energy source to the plurality of antennas without impeding out an antenna of the
3 plurality of antennas.

1 39. The method of claim 36, wherein 5 to 50 watts of electromagnetic
2 energy source to the plurality of antennas without impeding out an antenna of the
3 plurality of antennas.

1 40. The method of claim 36, wherein the ablation volume is a
2 spheroid geometry.

1 41. The method of claim 36, wherein the ablation volume is a
2 spherical geometry.

1 42. The method of claim 36, wherein the ablation volume is a partial
2 spherical geometry.

1 43. The method of claim 36, wherein the ablation volume is formed
2 continuously between adjacently deployed antennas of the plurality.

1 44. The method of claim 36, wherein the trocar has an outer diameter
2 no greater than 15 gauge.

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